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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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MADAN, MOSSMAN & SRIRAM, P.C.
2603 AUGUSTA
SUITE 700
HOUSTON, TX 77057

EXAMINER	
HUGHES, SCOTT A	
ART UNIT	**PAPER NUMBER**
3663	

DATE MAILED: 08/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/806,009	GASTON ET AL.
	Examiner	Art Unit
	Scott A. Hughes	3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-11 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that the coded signals taught by Anderson are sweep signals that comprise a swept frequency signal. Applicant argues that successive sweeps have a predetermined phase relation to each other, and therefore they do not have an arbitrary pattern. This argument is not persuasive because applicant does not specifically define what is meant by arbitrary pattern in the specification. The specification states, "This pattern may be arbitrary or contain information about the time of source activation ("Source Time"), thus enabling transit time calculation downhole as well as absolute time of "first break arrival"." This is the only context in which arbitrary is mentioned by the applicant in the specification. Reading the term "arbitrary" broadly, the signals are Anderson are arbitrary since they depend on the number of sweeps put into the sequence (360/N for the phase) and also discloses that they can be of different times. Since the sweeps do not need to be of one fixed time and frequency, they can be changed and are therefore arbitrary.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cecconi in view of Harmon (6584406) and Robbins.

With regard to claim 1, Cecconi discloses a method for acquiring seismic data while drilling a well (Column 1, Lines 1-10). Cecconi discloses conveying at least one seismic receiver 12 installed in a drill string 5 (Fig. 1a). Cecconi discloses that the receiver is controlled in part by an associated accelerometer that generates signal to control seismic data acquisition (Column 8, Line 37 to Column 9, Line 7). Cecconi discloses generating seismic signals by a seismic source 6 at a surface location 7, and detecting the seismic signals with at least one sensor 18 in the at least one seismic receiver 12 at at least one location in the wellbore (Column 3, Lines 40-65). Cecconi discloses computing a propagation time for the detected seismic signals in the seismic receiver using the activation time of the source (Cecconi discloses finding the direct wave travel time, and the reference for the start of the time in which the wave travels on the direct path is the time at which the source is activated) (Column 1, Lines 12-17; Column 3, Lines 40-63). Cecconi discloses that the propagation time is of the direct signal. This is read as being an arrival time since the time of arrival of the signal would be the same as the time it takes the signal to propagate from the source (activation time) to the receiver. Cecconi does not disclose that the signal is a coded signal including information about an activation time of the source. Cecconi discloses the use of a seismic vibrator as the source for the signals that are imparted into the formation surrounding the well. Harmon teaches that vibrators (Vibroseis sources – Column 4)

are capable of imparting coded seismic signals into a formation that contain information about the activation time of a source (Column 4, Lines 45-55; Column 5, Lines 15-65; Column 10, Line 10 to Column 11, Line 20; Column 11, Liner 60 to Column 12, Line 5; Column 13, Line 3 to Column 14, Line 48; Column 16, Lines 49-65; Column 17, Line 1 to Column 18, Line 55). Harmon teaches using a coded signal containing information about the activation time of a surface source in that the command SISS signals are generated at certain times, and that these times of source activation are set up by an operator to synchronize downhole clocks so that arrival times can be calculated. It would have been obvious to modify Cecconi to include using the vibrator source to create coded seismic signals with activation time information as taught by Harmon in order to be able to synchronize the clocks in the downhole device with the master clocks of the system so that the arrival times calculated for seismic signals are free from errors due to clock drift of the downhole clocks. Cecconi discloses receiving the signals in at the receivers in the drill string. Cecconi does not disclose that the computation of the arrival (propagation) time is done in the receiver. Robbins discloses a seismic receiver on a drill string that receives signals generated by a surface source (Fig. 1) and uses the reflected signals to position reflectors ahead of a drill bit (Column 5). Robbins discloses computing the arrival times of the signals in the receiver (Column 3, Line 59 to Column 4, Line 16). Robbins discloses that these arrival times are then used to find the total travel times (propagation times) from the source to the receiver. It would have been obvious to modify Cecconi to include computing the arrival time in the receiver as taught by Robbins in order to obtain a time stamp for the received data that can be sent

along with the data to a surface processor for further processing without removing the drill string.

With regard to claim 2, Robbins discloses that the computed arrival time is transferred to a surface processor (Column 3, Line 59 to Column 4, Line 16). Cecconi also discloses a surface processor. It would have been obvious to modify Cecconi to include computing the arrival time in the receiver as taught by Robbins in order to obtain a time stamp for the received data that can be sent along with the data to a surface processor for further processing without removing the drill string.

With regard to claim 3, Robbins discloses that the computed arrival time is stored in the seismic receiver (Column 3, Lines 59-68).

With regard to claim 4, Cecconi does not disclose a coded seismic signal comprising discrete timed events. Harmon teaches that the coded seismic signals further comprise timed discrete events (Column 5, Lines 15-65; Column 10, Line 10 to Column 11, Line 20; Column 11, Liner 60 to Column 12, Line 5; Column 16, Lines 49-65; Column 18, Lines 1-55). It would have been obvious to modify the vibrator source disclosed by Cecconi to include coded seismic signals that comprise discrete timed events in order to match a recorded seismic wave with a specific wave generated by the source so that the operator of a seismic survey knows that the seismic data being recorded is matched with the seismic waves imparted into the earth by the survey source.

With regard to claim 5, Cecconi does not disclose a coded signal comprising timed discrete frequencies. Harmon teaches that coded signals can comprise timed

discrete frequencies (Column 4, Lines 40-63). It would have been obvious to modify the vibrator source disclosed by Cecconi to include coded seismic signals that comprise discrete timed events in order to match a recorded seismic wave with a specific wave generated by the source so that the operator of a seismic survey knows that the seismic data being recorded is matched with the seismic waves imparted into the earth by the survey source.

With regard to claim 6, Cecconi does not disclose a plurality of receivers located along a drill string. Cecconi discloses one tool with a seismic sensor located in a drill string, but not a plurality of tools. Robbins teaches a plurality of receivers located along the drill string (Fig. 1) (Column 4, Lines 60-68). It would have been obvious to modify Cecconi to include a plurality of receivers along the drill string instead of the one receiver in order to be able to take data at multiple depths of the borehole simultaneously instead of having to move the one receiver to a new location each time data for a new depth was desired.

With regard to claim 7, Cecconi discloses detecting the seismic signal with at least one sensor 8 located at the surface and storing the signal detected by the surface sensor in a surface processor 9 (Column 3, Lines 29-45). It would have been obvious to use the coded signals taught by Harmon for the reasons given above in reference to claim 1.

With regard to claim 8, Cecconi discloses transferring the signals stored in the seismic receiver to a surface processor upon removal of the drill string form the wellbore (Columns 9 and 10).

With regard to claim 9, Cecconi discloses processing, according to programmed instructions, the surface detected signals and the seismic receiver detected signals to generate a seismic map (Column 1, Lines 1-20; Column 4, Lines 28-65). Cecconi discloses calculating a vertical seismic profile and the position of reflectors located under the drill bit. Applicant does not specifically define the type or details of the map in the speciation or the claim (states it is a map of subsurface features and formation). Therefore, any type of map reads on the claim. Cecconi's disclosure of calculating positions of reflectors and of finding the vertical seismic profile is read as being a seismic map since the locations of the reflectors are found and a profile of the formation is made (read as a seismic map of locations of reflectors).

With regard to claim 10, Cecconi discloses a method for acquiring seismic data while drilling a well (Column 1, Lines 1-10). Cecconi discloses conveying at least one seismic receiver 12 installed in a drill string 5 (Fig. 1a). Cecconi discloses that the receiver is controlled in part by an associated accelerometer that generates a signal to control seismic data acquisition (Column 8, Line 37 to Column 9, Line 7). Cecconi discloses generating a seismic signal by a seismic source 6 at a surface location 7, and detecting the seismic signal with at least one sensor 18 in the at least one seismic receiver 12 at at least one location in the wellbore (Column 3, Lines 40-65). Cecconi does not disclose that the signal is a coded signal including information about an activation time of the source. Cecconi discloses the use of a seismic vibrator as the source for the signals that are imparted into the formation surrounding the well. Harmon teaches that vibrators (Vibroseis sources – Column 4) are capable of imparting coded

seismic signals into a formation that contain information about the activation time of a source (Column 4, Lines 45-55; Column 5, Lines 15-65; Column 10, Line 10 to Column 11, Line 20; Column 11, Liner 60 to Column 12, Line 5; Column 13, Line 3 to Column 14, Line 48; Column 16, Lines 49-65; Column 17, Line 1 to Column 18, Line 55). Harmon teaches using a coded signal containing information about the activation time of a surface source in that the command SISS signals are generated at certain times, and that these times of source activation are set up by an operator to synchronize downhole clocks so that arrival times can be calculated. It would have been obvious to modify Cecconi to include using the vibrator source to create coded seismic signals with activation time information as taught by Harmon in order to be able to synchronize the clocks in the downhole device with the master clocks of the system so that the arrival times calculated for seismic signals are free from errors due to clock drift of the downhole clocks. Cecconi does not disclose computing, in the seismic receiver, a check shot transit time for the detected seismic signals, and transferring the check shot transit time to the surface. Cecconi discloses computing the time (delta t) that it takes for the direct path wave to go from the source to the receiver in the borehole using the activation time of the source (Cecconi discloses finding the direct wave travel time, and the reference for the start of the time in which the wave travels on the direct path is the time at which the source is activated) (Column 1, Lines 12-17; Column 3, Lines 40-63). Cecconi discloses taking these measurements every 10m, which is a known depth increment. Cecconi does not disclose that the timing measurements are check-shot measurements and does not disclose transferring check-shot measurements to the

surface. Cecconi discloses receiving the signals in at the receivers in the drill string. Cecconi does not disclose that the computation of the arrival (propagation) time is done in the receiver. Robbins discloses a seismic receiver on a drill string that receives signals generated by a surface source (Fig. 1) and uses the reflected signals to position reflectors ahead of a drill bit (Column 5). Robbins discloses computing the arrival times of the signals in the receiver (Column 3, Line 59 to Column 4, Line 16). Robbins discloses that these signals are check-shot transit times (Column 3, Lines 59 to Column 4, Line 8). Robbins discloses transferring the check shot transit times to the surface (Column 3, Line 59 to Column 4, Line 15). Robbins discloses that these check shot times are then used to find the total travel times (propagation times) from the source to the receiver. It would have been obvious to modify Cecconi to include computing the check shot time in the receiver and sending this to the surface as taught by Robbins in order to obtain a time stamp for the received data that can be sent along with the data to a surface processor for further processing without removing the drill string.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cecconi in view of Anderson and Robbins.

With regard to claim 11, Cecconi discloses a method for acquiring seismic data while operating a drill string in a wellbore (Column 1, Lines 1-10). Cecconi discloses synchronizing, at the surface, a surface clock 48 in a surface controller 10 with a downhole clock 23 in a seismic receiver 12 (Figs. 1a, 3) (Column 4, Lines 52-65; Column 8, Lines 15-36; Columns 6-10 in general). Cecconi discloses programming, at

the surface, a processor in the seismic receiver to activate during at least one predetermined time window after a predetermined delay time (Column 8, Lines 37-50). Cecconi discloses that the receiver is programmed beforehand, meaning that is programmed before being used in the well and therefore it is programmed at the surface. Cecconi discloses conveying the seismic receiver in the drill string to a location of interest in the wellbore (Column 8, Lines 37-50; Column 1, Lines 1-30) (Fig. 1a). Cecconi discloses generating, under control of a surface processor, a seismic signal by a seismic source 6 near a surface location (Fig. 1a) (Column 3, Lines 29-40; Column 10, Lines 27-34). Cecconi discloses a control module attached to the seismic source, and states that the source transmits waves that are detected by the sensors. Cecconi discloses detecting the seismic source signals with a near-source sensor 8 and storing the signals in the surface processor 9 (Column 3, Lines 29-65). Cecconi discloses detecting the seismic signals with at least one sensor in the seismic receiver 12 at a location of interest 13 in the wellbore (Column 3, Lines 41-64). Cecconi discloses storing the seismic signals in the receiver and transferring the detected seismic signals from the seismic receiver to the surface processor (Columns 9 and 10). Cecconi discloses processing the near-source signals and the seismic receiver detected signals according to programmed instructions to generate a seismic map (Column 1, Lines 1-20; Column 4, Lines 28-65). Cecconi discloses calculating a vertical seismic profile and the position of reflectors located under the drill bit. Applicant does not specifically define the type or details of the map in the speciation or the claim (states it is a map of subsurface features and formation). Therefore, any type of map reads on the claim.

Cecconi's disclosure of calculating positions of reflectors and of finding the vertical seismic profile is read as being a seismic map since the locations of the reflectors are found and a profile of the formation is made (read as a seismic map of locations of reflectors). Cecconi does not disclose that the signal is a coded signal comprising an arbitrary pattern. Cecconi discloses the use of a seismic vibrator as the source for the signals that are imparted into the formation surrounding the well. Andersen teaches that vibrators are capable of imparting coded seismic signals of an arbitrary pattern into a formation as sweeps (Column 1, Line 35 to Column 2, Line 33; Column 3; Column 4, Line 52 to Column 5, Line 20 to Column 7). It would have been obvious to modify Cecconi to include using the vibrator source to create coded seismic signals of an arbitrary pattern as taught by Andersen in order to be able to match a recorded seismic wave with a specific wave generated by the source so that the operator of a seismic survey knows that the seismic data being recorded is matched with the seismic waves imparted into the earth by the survey source.

Conclusion

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAH

JACK KEITH
SUPERVISORY PATENT EXAMINER